

REMARKS/ARGUMENTS

This amendment is submitted in response to the office action mailed February 11, 2003. A Request for a One Month Extension of Time, pursuant to 37 CFR 1.136(a), is submitted herewith, along with the fee prescribed by 37 CFR 1.17(a)(1). The response is therefore timely.

Claims numbered 1-47 were examined, although the claims numbered 36-47 should have been numbered 33-44, and are so designated in the above amendment. Hereinafter, the claims will be referred to by their correct numbers, i.e., the claims numbered as 36-47 in the application will be referred to as claims 33-44.

Claims 1-20 and 35-44 were examined. Claims 21-34 were withdrawn from consideration pursuant to a restriction requirement, and are hereby canceled without prejudice to applicant's right to resubmit them in a divisional application. Of the examined claims, all were rejected except claim 20, which was held to define allowable subject matter, but was objected to as depending from a rejected base claim. By this amendment, Claims 1-20 and 35-44 have been canceled, and have been replaced by new claims 45-50. As explained below, it is respectfully submitted that claims 45-50 define patentably over the art of record.

Before turning to the claims, the Examiner's objections to the drawings and specification will be addressed.

The drawings were objected to for failure to show the reference number "22" recited on page 13 of the specification, and for failure to show the reference numbers "72a-e" recited on page 15. The specification has been amended to delete the recitation of these reference numbers, inasmuch as structure corresponding to these numbers either does not appear in the drawings, or is designated by other numbers. No new matter has been added. It is believed that this amendment to the specification addresses the Examiner's concerns and obviates the need to amend the drawings.

The specification has been further amended to address the Examiner's objections, with the following exception: The element 102 referenced at page 16, line 26 and page 17, line 4 is, indeed, a riser support and not a riser. Other informalities and numbering errors have been corrected. No new matter has been added.

Finally, the Abstract has been amended to overcome the Examiner's objections.

Turning now to the claims, all of the examined claims (except for claim 20) were rejected as unpatentable over either US 5,279,368 - Arnott; or International Publication No. WO 01/77563 - CRP Group. As explained below, it is respectfully submitted that new claims 45-50 define patentably over these references and the other art of record.

New claim 45 defines a VIV reduction mechanism for application to the exterior surface of substantially cylindrical structure, wherein the mechanism comprises "a plurality of

columnar segments disposed around the exterior surface of the structure in a vertically stacked arrangement, each of the segments having a vertical surface discontinuity oriented substantially parallel to the axis of the structure, the segments being arranged with respect to each other so that the surface discontinuity of each segment is circumferentially displaced from the surface discontinuity of an adjacent segment, whereby the surface discontinuities of the plurality of segments define a discontinuous, stepwise, approximately helical pattern along the length of the structure." Embodiments of the present invention that include the structure defined in this claim are illustrated in Figures 4-13. In this embodiment, as best shown in Figures 4 and 9, the surface discontinuity of each segment is substantially parallel to the axis of the substantially cylindrical structure, but the discontinuity of each successive segment is circumferentially displaced from that of the previous segment so that a discontinuous stepwise, substantially helical pattern of discontinuities is formed along the length of the structure.

It is respectfully submitted that neither the Arnott nor the CRP Group reference discloses or suggests the structure defined in Claim 45. For example, Arnott relates to an anti-fouling covering for a cylindrical structure (e.g., a pipe), wherein the covering is formed as a continuous strip that is wrapped around the exterior of the structure. Significantly, there is no VIV reduction function recited, and the troughs or indentations 14 formed in the covering are provided solely to accommodate expansion and contraction. Indeed, the object is to minimize the surface area occupied by the indentations (see column 4, lines 30-53), so as to approximate a smooth cylinder

and thereby minimize the drag coefficient of the structure to keep fluid loading as low as possible. See column 4, line 59 to column 5, line 1. The need to minimize the coefficient of drag and consequent fluid loading is contrary to the purpose of the claimed invention, which requires a significant drag-producing structure to produce the VIV reduction effect. Moreover, the Arnott device is a continuous strip, in contrast to the claimed invention, which comprises a plurality of vertically stacked columnar segments.

The CRP Group reference discloses a VIV reduction mechanism comprising one or more helical strakes or fins formed on a pipe cladding. In one embodiment, the cladding is formed from a series of discrete sections, each having segments of the strake or strakes. The strake segments, however, are angled with respect to the axis of the structure, so that a substantially continuous helical strake is formed. By contrast, the present invention, as defined in Claim 45, comprises a series of discontinuities, each of which is substantially parallel to the axis of the structure, whereby the circumferential positions of successive discontinuities creates a discontinuous, stepwise pattern that only approximates a helix.

Accordingly, it is respectfully submitted that Claim 45 defines structure that is neither shown nor suggested by the cited references, and is therefore patentable over these references. Claims 46-48, which depend from Claim 45, are likewise believed to be patentable over the cited art.

Claim 49 defines the invention as "a plurality of columnar segments disposed around the exterior surface of the structure

in a vertically stacked arrangement, each of the segments having a non-circular cross-sectional shape, each of the segments being angularly offset from an adjacent segment, whereby the plurality of segments forms a twisted, spiral shape." This claim defines the embodiment shown in Figures 24-29. The prior art of record neither shows nor suggests a vertically stacked arrangement of non-circular columnar segments that are angularly offset from each other to form a VIV reduction structure having a twisted spiral shape. Therefore, it is respectfully submitted that Claim 49 defines patentably over the art of record.

Claim 50 defines the invention as "a plurality of columnar segments disposed around the exterior surface of the structure in a vertically stacked arrangement, each of the segments having a non-circular cross-sectional shape, each of the segments being angularly offset from an adjacent segment, whereby the plurality of segments forms a discontinuous, stepped exterior shape." This claim defines the embodiment shown in Figures 30-35. The prior art of record neither shows nor suggests a vertically stacked arrangement of non-circular columnar segments that are angularly offset from each other to form a VIV reduction structure having a discontinuous, stepped exterior shape. Therefore, it is respectfully submitted that Claim 50 defines patentably over the art of record.

In summary, it is respectfully submitted that new claims 45-50 define patentably over the art of record. All other issues presented in the office action having been addressed herein passage of the application to issue is respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 11-1159 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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